

**OHIO TURNPIKE COMMISSION**

**ADDENDUM NO. 2**

**CONTRACT NO. 39-12-02**  
**WESTBOUND RIGHT TWO (2) LANES AND SHOULDER RECONSTRUCTION**  
**MILEPOST 164.82 TO MILEPOST 169.74**  
**CUYAHOGA COUNTY, OHIO**

OPENING DATE: (AS PREVIOUSLY EXTENDED) 2:00 P.M. (E.S.T.), MARCH 1, 2012

**ATTENTION OF BIDDERS IS DIRECTED TO:**

**ANSWERS TO QUESTIONS RECEIVED THROUGH 2:00 P.M., FEBRUARY 23, 2012**

**MODIFICATIONS TO THE CONTRACT DOCUMENTS**

**MODIFICATIONS TO THE BID FORM**

Pages OTC-BF-2, BF-4, and BF-7

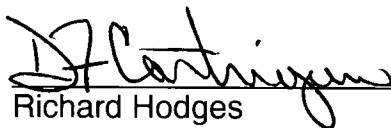
**MODIFICATIONS TO THE PLAN SHEETS**


Plan Sheets 5, 8, 9, 40A – 40G, 50, 51, 57, 62, 65 and 116 of 128

**MODIFICATIONS TO THE SPECIFICATIONS**

ODOT SUPPLEMENTAL SPECIFICATION 848

Issued by the Ohio Turnpike Commission February 23, 2012. Issuance authorized by Richard Hodges, Executive Director and Kathleen Weiss, General Counsel.

 for 2-23-12  
Richard Hodges Date

 2-23-2012  
Kathleen Weiss Date

**OHIO TURNPIKE COMMISSION  
ADDENDUM NO. 2  
CONTRACT NO. 39-12-02**

**ANSWERS TO QUESTIONS RECEIVED THROUGH 2:00 P.M., FEBRUARY 23, 2012**

**Q#2** Ref. 32 "Sediment Basins and Dams"- plan sheets 62 and 65 show proposed locations and volumes. However, in both cases plans show these being built behind guardrail and around fiber optic lines. While the attached ODOT standard drawing does give parameters, the SWPPP plans give nothing more than a location and a footprint. Are these footprint areas meant to be used as limits of the tops of the basins? If the basins are behind guardrail and on slopes can these basins be safely built as to not cause slippage? Please provide more details for these basin sizes and limitations.

**A#2** *Proposed locations of sediment basins have been revised as shown on the attached Plan Sheets 62 and 65 of 128. The basin sizes shown on the Plans are determined by their location and the contributing drainage area flowing into each basin. The Contractor may change the location and size of the sediment basins with the understanding that the ultimate location and dimensions of the basin are left to the contractor to finalize as the party responsible for its construction and maintenance. The Contractor is reminded that the final basin size must conform to the Ohio EPA NPDES General Permit for Construction Storm Water based on the drainage area to the actual location of the basin in the field. (See changes outlined below in this Addendum No. 2 and the attached replacement Plan Sheets 62 and 65 of 128).*

**Q#15** Plan sheet 8 gives calculations for the base bid and alternate bid excavation items. It appears that the incorrect depths are being used on the shoulder excavation (based on depth of new materials in place less milling depth of existing). Please review and revise quantities in an addendum.

**A#15** *Quantities have been revised. (See changes outlined below in this Addendum No. 2 and the attached replacement Bid Form pages BF-2 and BF-7 and Plan Sheets 8, 50 and 51 of 128).*

**Q#18** Plan sheet 116, SS848.26 - .27 notes that "all westbound vehicular traffic shall be diverted into the contraflow on the eastbound roadway during these operation". The way this note is interpreted means that the westbound service plaza will be shut down given the MOT schematic and that OTC traffic will be one lane only during peak traffic periods in the summer months. Furthermore, the note states "all traffic zones and lane closures shall be in accordance with SP 104", which does address in general single lane closures but is without specifics for this situation. Finally, there is nothing in the MOT plan sheets indicating how the contractor is to shut off the access to the non-contraflow westbound lane as well as the off-ramp to the service plaza. Please review this situation and provide details in an addendum.

**A#18** *The Item 614 – Maintaining Traffic Plan Note on Sheet 116 of 128 has been revised. Plan Sheets 40A through 40G of 128 have also been added to the Plans to further clarify this operation. (See changes outlined below in this Addendum No. 2 and the attached replacement Plan Sheets 116, and 40A through 40G of 128).*

Q#19 Will the joint fabric as detailed on page 5 of the plans be required for the longitudinal joint in the new pavement if the asphalt option is selected?

**A#19** *As stated in Addendum No. 1, Item Special – Asphalt Pavement Reinforcement currently shown on the plans over the center/right lane longitudinal joint will be deleted from this Project, regardless of which base pavement alternate is selected. In addition, the placement depth of the Asphalt Pavement Reinforcement over the left/center lane longitudinal joint has been lowered to be placed directly on the new base pavement, the width of the material was reduced and the specified material was revised to GlasGrid CG200. (See changes outlined below in this Addendum No. 2 and the attached replacement Bid Form page BF- 4 and Plan Sheets 5, 9, 51, and 57 of 128).*

Q#27 Will OTC provide an area for contractors to store cement materials, whether at an interchange or travel plaza?

**A#27** *The areas identified in Exhibit A, as issued with Addendum No. 1, may also be used by the Contractor for the purposes of material storage/stockpiles and batch plants. Any usage of the areas identified in Exhibit A is subject to the requirements outlined therein. The Commission does not guarantee that these areas provide sufficient space to meet the needs of the Contractors' intended use and Contractors are advised to thoroughly review the sites prior to bidding.*

Q#28 Will OTC provide a source for water for contractor use at one of the interchanges or travel plazas?

**A#28** *Contractors may utilize water sources on Commission property. All water usage will be metered by the Commission and will be charged to the Contractor. The Commission does not guarantee that existing water sources will provide sufficient volume to meet the needs of the Contractors' intended use and Contractors are advised to thoroughly review the sources prior to bidding.*

Q#29 How can Ref #160 Bituminous Aggregate Base, which is an alternate for Ref # 85 12" Non-Reinforced Concrete Pavement be based on a pavement thickness of 11" not 12"? Also there is less excavation required under Ref 159. Shouldn't these paving sections be the same thickness in order to make the costs comparable?

**A#29** *The alternate pavement sections were designed using current AASHTO and ODOT design equations and the ODOT Pavement Design Manual. The pavement designs contained in the Plans have been confirmed to accurately follow current pavement design procedures and guidelines. Therefore, no revisions will be made.*

Q#30 After reviewing the answer to Question #12 in Addendum #1 it is not clear if portable concrete plants will be allowed on the areas shown in Exhibit A of the addendum. Will portable concrete plants be allowed in the areas shown in Exhibit A?

**A#30 See Answer #27 above.**

## **MODIFICATIONS TO THE CONTRACT DOCUMENTS**

**The following changes are made to the Contract Documents for Contract No. 39-12-02:**

Deletions are shown with strikethrough text.

Changes/Additions are shown with ***bold italicized*** text.

### **Modifications to the Bid Form via Addendum No. 2**

**(Bidders are advised to utilize the attached replacement Bid Form pages OTC-BF-2, OTC-BF-4 and OTC-BF-7).**

Page BF-2: Under Ref. No. 10, Item 203 – EXCAVATION, the Approx. Quantity has been revised from 27,214 CU YD to ***26,340*** CU YD.

Page BF-4: Under Ref. No. 90, Item SPECIAL – ASPHALT PAVEMENT REINFORCEMENT, the Approx. Quantity has been revised from 13,709 SQ YD to ***6,853*** SQ YD.

Page BF-7: Under Ref. No. 159, Item 203 – EXCAVATION (replaces Ref. No. 10), the Approx. Quantity has been revised from 24,484 CU YD to ***23,607*** CU YD.

### **Modifications to the Plan Sheets via Addendum No. 2**

**(Bidders are advised to utilize the attached replacement Plan Sheets 5, 8, 9, 40A through 40G, 50, 51, 57, 62, 65, and 116 of 128).**

Changes to the Plan Sheets: Additions and deletions are indicated with a cloud and revision triangle thus:



Plan Sheet 5 of 128:

PAVEMENT JOINT DETAIL revised the placement depth and the width of the ASPHALT PAVEMENT REINFORCEMENT.

LONGITUDINAL JOINT DETAIL revised to delete the ASPHALT PAVEMENT REINFORCEMENT.

Plan Sheet 8 of 128: ITEM 203 – EXCAVATION Plan Note quantity calculations revised to result in the BASE BID: SHOULDER EXCAVATION quantity revised from ~~15,077~~ CU. YD. to ***14,203*** CU. YD. and the ITEM 203 – EXCAVATION sum revised from 27,153 CU. YD. to ***26,279***

CU. YD.; ALTERNATE BID: SHOULDER EXCAVATION quantity revised from ~~14,203~~ CU. YD. to **13,329** CU. YD. and the ITEM 203 – EXCAVATION sum revised from ~~24,420~~ CU. YD. to **23,546** CU. YD.

Plan Sheet 9 of 128: ITEM SPECIAL – ASPHALT PAVEMENT REINFORCEMENT Plan Note revised the specified material from “GLASGRID – 8502” TO “GLASGRID – **CG200**”.

Plan Sheets 40A through 40G of 128: Added these new Sheets to the Contract Plans.

Plan Sheet 50 of 128: ITEM 203 - EXCAVATION, the quantity for SHEET NUMBER 8 revised from ~~27153~~ CU YD to **26279** CU YD, and the quantity for GRAND TOTAL revised from ~~27214~~ CU YD to **26340** CU YD.

Plan Sheet 51 of 128:

ITEM SPECIAL – ASPHALT PAVEMENT REINFORCEMENT, the quantity for SHEET NUMBER 57 revised from ~~13709~~ SQ YD to **6853** SQ YD, and the quantity for GRAND TOTAL revised from ~~13709~~ SQ YD to **6853** SQ YD.

ITEM 203 - EXCAVATION, the quantity for SHEET NUMBER 8 revised from ~~24420~~ CU YD to **23546** CU YD, and the quantity for GRAND TOTAL revised from ~~24481~~ CU YD to **23607** CU YD.

Plan Sheet 57 of 128: ITEM SPECIAL – ASPHALT PAVEMENT REINFORCEMENT, quantity for STA. 603+50.00 TO STA. 636+41.99 revised from ~~1829~~ SQ YD to **914** SQ YD; quantity for STA. 643+62.24 TO STA. 679+13.43 revised from ~~1973~~ SQ YD to **986** SQ YD; quantity for STA. 682+11.45 TO STA. 802+29.45 revised from ~~6677~~ SQ YD to **3338** SQ YD; quantity for STA. 805+75.54 TO STA. 863+90.00 revised from ~~3230~~ SQ YD to **1615** SQ YD; and the quantity for TOTALS CARRIED TO GENERAL SUMMARY revised from ~~13709~~ SQ YD to **6853** SQ YD.

Plan Sheet 62 of 128: Revised location for the SEDIMENT BASIN from approximate beginning Sta. 696+75 to approximate beginning Sta. 701+00; revised CONTRIBUTING DRAINAGE AREA from ~~14.25~~ AC to **13.35** AC; and revised MINIMUM REQUIRED STORAGE VOLUME from ~~954.75~~ CY to **904.25** CY.

Plan Sheet 65 of 128: Revised location for the SEDIMENT BASIN from approximate beginning Sta. 827+25 to approximate beginning Sta. 829+50; revised CONTRIBUTING DRAINAGE AREA from ~~6.36~~ AC to **5.84** AC; and revised MINIMUM REQUIRED STORAGE VOLUME from ~~426.12~~ CY to **391.28** CY.

Plan Sheet 116 of 128:

Plan Note REFERENCE SHALL BE MADE TO THE FOLLOWING ODOT SUPPLEMENTAL SPECIFICATIONS deleted all text for subsections SS848.26 - .27.

SP 614 – MAINTAINING TRAFFIC Plan Note, completely replaced all text addressing various phases of the bridge maintenance Work.

**Modifications to the Specifications via Addendum No. 2**

Added ODOT SUPPLEMENTAL SPECIFICATION 848 – BRIDGE DECK REPAIR AND OVERLAY WITH CONCRETE USING HYDRO-DEMOLITION pages 1 - 20 dated October 21, 2011.

Receipt of Addendum No. 2 to Contract No. 39-12-02 is hereby acknowledged:

\_\_\_\_\_  
(Firm Name)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Printed Name)

Date: \_\_\_\_\_

**CONTRACT NO. 39-12-02 BID FORM**

Ref. No.	Item No.	Item Description	Approx. Quantity	Unit	Unit Cost	Extended Bid Amount
<b>ROADWAY (Ref. Nos. 1 - 30)</b>						
1	201	CLEARING AND GRUBBING	LUMP	LUMP		
2	202	CATCH BASIN REMOVED	15	EACH		
3	202	CURB REMOVED	4,502	FT		
4	202	GUARDRAIL REMOVED	12,622	FT		
5	202	GUARDRAIL REMOVED FOR SALVAGE, AS PER PLAN	50	FT		
6	202	APPROACH SLAB REMOVED	758	SQ YD		
7	202	HEADWALL REMOVED	2	EACH		
8	202	CONCRETE BARRIER REMOVED	571	FT		
9	202	PAVEMENT REMOVED	66,030	SQ YD		
10	203	EXCAVATION	<b>27,214 26,340</b>	CU YD		
11	203	EMBANKMENT	11	CU YD		
12	254	PAVEMENT PLANING, ASPHALT CONCRETE	100,097	SQ YD		
13	254	PAVEMENT PLANING, ASPHALT CONCRETE (VARIABLE DEPTH)	3,364	SQ YD		
14	SP536	CONCRETE WEATHERPROOFING, BARRIERS AND PARAPETS	216	SQ YD		
15	606	GUARDRAIL, TYPE 5, USING STEEL POST	5,587.50	FT		
16	606	GUARDRAIL, TYPE 5, USING STEEL POST (9' POSTS)	7,317	FT		
17	606	ANCHOR ASSEMBLY, TYPE T, USING STEEL POST	6	EACH		
18	606	BRIDGE TERMINAL ASSEMBLY, TYPE 1, USING STEEL POST	6	EACH		
19	606	BRIDGE TERMINAL ASSEMBLY, TYPE 2, USING STEEL POST	5	EACH		
20	SP606E	ANCHOR ASSEMBLY, TYPE E (ET-2000 PLUS)	7	EACH		
21	609	CURB , TYPE 4-A	132	FT		
22	609	ASPHALT CONCRETE CURB, PG64-22 STANDARD, TYPE 1	4,504	FT		
23	SP611	CLASS C, CONCRETE APPROACH SLAB USING TYPE I CEMENT (T=12")	747	SQ YD		
24	622	CONCRETE BARRIER, TYPE D, AS PER PLAN	293	FT		
25	622	CONCRETE BARRIER, TYPE B-50, AS PER PLAN	379	FT		
26	SP622A	TEMPORARY PORTABLE BARRIER	152	FT		
27	SP625	CONDUIT, 4" WITH 3 CELL INNERDUCT, 725.05	379	FT		
28	SP625	CONDUIT, 4" WITH 4 CELL INNERDUCT, 725.05	379	FT		
29	626	BARRIER REFLECTOR, TYPE A	169	EACH		
30	626	BARRIER REFLECTOR, TYPE B	9	EACH		
<b>TOTAL - ROADWAY</b>						

# CONTRACT NO. 39-12-02 BID FORM

Ref. No.	Item No.	Item Description	Approx. Quantity	Unit	Unit Cost	Extended Bid Amount
		<b>PAVEMENT (Ref. Nos. 63 - 93)</b>				
63	206	CEMENT STABILIZED SUBGRADE, 12 INCHES DEEP, AS PER PLAN	60,200	SQ YD		
64	206	CEMENT STABILIZED SUBGRADE, 14 INCHES DEEP, AS PER PLAN	36,787	SQ YD		
65	206	CEMENT	3,084	TON		
66	206	WATER FOR CURING	1.3	M GAL		
67	206	TEST ROLLING	33	HOURL		
68	251	PARTIAL DEPTH PAVEMENT REPAIR	1,500	SQ YD		
69	252	FULL DEPTH PAVEMENT SAWING	25,274	FT		
70	255	FULL DEPTH PAVEMENT REMOVAL AND RIGID REPLACEMENT	1,500	SQ YD		
71	255	FULL DEPTH PAVEMENT SAWING	300	FT		
72	SP302	BITUMINOUS AGGREGATE BASE COURSE, PG64-22	36	CU YD		
73	SP304	AGGREGATE BASE	12,089	CU YD		
74	SP304	AGGREGATE BASE (SHOULDER)	6,456	CU YD		
75	SP402	ASPHALT CONCRETE BASE COURSE OR RECYCLED ASPHALT CONCRETE BASE COURSE, PG64-22	1,643	CU YD		
76	SP402	ASPHALT CONCRETE BASE COURSE OR RECYCLED ASPHALT CONCRETE BASE COURSE, PG70-22 (FR)	3,599	CU YD		
77	SP404	ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED SLAG, PG64-22	1,026	CU YD		
78	SP404	ASPHALT CONCRETE SURFACE COURSE, USING CRUSHED SLAG, PG70-22 (FR)	3,084	CU YD		
79	SP404	ASPHALT CONCRETE FOR MAINTAINING TRAFFIC ON CROSSEVER, PG64-22	130	CU YD		
80	SP404A	JOINT SEALER	31,543	FT		
81	407	TACK COAT, TRACKLESS TACK, AS PER PLAN	13,064	GALLON		
82	SP407	TACK COAT	266	GALLON		
83	SP407	TACK COAT FOR INTERMEDIATE COURSE	414	GALLON		
84	452	NON-REINFORCED CONCRETE PAVEMENT (T = 15")	228	SQ YD		
85	452	NON-REINFORCED CONCRETE PAVEMENT (T = 12")	71,285	SQ YD		
86	SPECIAL	ROLLER COMPACTED CONCRETE (T = 9")	24,457	SQ YD		
87	SP617	SHOULDER PREPARATION	4,183	SQ YD		
88	SP617	COMPACTED AGGREGATE	349	CU YD		
89	SP627	STONE SHOULDER PROTECTION	384	CU YD		
90	SPECIAL	ASPHALT PAVEMENT REINFORCEMENT	13,709 <b>6,853</b>	SQ YD		
91	SPECIAL	PRESSURE RELIEF JOINT, TYPE A	500	FT		
92	SPECIAL	SONIC NAP ALERT PATTERN (SNAP)	5.07	MILE		
93	SPECIAL	SAW CUT JOINT	29,288	FT		
<b>TOTAL - PAVEMENT</b>						



# CONTRACT NO. 39-12-02 BID FORM

Ref. No.	Item No.	Item Description	Approx. Quantity	Unit	Unit Cost	Extended Bid Amount
		<b>GENERAL (Ref. Nos. 155 - 158)</b>				
155	IB. ART 6	PREMIUM FOR CONTRACT PERFORMANCE BOND AND PAYMENT BOND	LUMP	LUMP		
156	SP619	FIELD OFFICE	LUMP	LUMP		
157	SP623	CONSTRUCTION LAYOUT SURVEY	LUMP	LUMP		
158	624	MOBILIZATION	LUMP	LUMP		
<b>TOTAL - GENERAL</b>						
<b>TOTAL BASE BID (REF. NO. 1 THRU REF. NO. 158)</b>						
(Sum in words)			<b>DOLLARS</b>			

## MAINLINE AND SHOULDER PAVEMENT ALTERNATE

Ref. No.	Item No.	Item Description	Approx. Quantity	Unit	Unit Cost	Extended Bid Amount
		<b>MAINLINE EXCAVATION ALTERNATE</b>				
159	203	EXCAVATION (replaces Ref. No. 10)	24,420 <del>24,481</del> 23,607	CU YD		
<b>TOTAL - EXCAVATION ALTERNATE</b>						
<b>MAINLINE PAVEMENT ALTERNATE</b>						
160	SP302	BITUMINOUS AGGREGATE BASE COURSE, PG64-22 (MAINLINE)(replaces Ref. No. 85)	21,782	CU YD		
<b>TOTAL - MAINLINE PAVEMENT ALTERNATE</b>						
<b>SHOULDER PAVEMENT ALTERNATE</b>						
161	SP302	BITUMINOUS AGGREGATE BASE COURSE, PG64-22 (SHOULDER)(replaces Ref. No. 86)	5,435	CU YD		
<b>TOTAL - SHOULDER PAVEMENT ALTERNATE</b>						
<b>SHOULDER AGGREGATE ALTERNATE</b>						
162	SP304	RECYCLED AGGREGATE BASE, AS PER PLAN (SHOULDER)(replaces Ref. No. 74)	6,456	CU YD		
163	SPECIAL	CRUSHED MATERIAL STOCKPILE (this additional item complements Ref. No. 162)	10,000	CU YD		
<b>TOTAL - SHOULDER AGGREGATE ALTERNATE</b>						

NOTE: Bidders must submit a Total Base Bid (Ref. No. 1 thru Ref. No. 158) and may submit a Bid for Mainline Excavation Alternate (Ref. No. 159), Mainline Pavement Alternate (Ref. No. 160), Shoulder Pavement Alternate (Ref. No. 161), and Shoulder Aggregate Alternate (Ref. Nos. 162 and 163). However, Bidders are advised, per IB 2.6.3, that failure to bid on the Alternate items may result in rejection of a Bid should the Commission choose the alternate(s) for which the Contractor did not submit a Bid. The low Bid will be determined based on the lowest sum total of the Base Bid submitted for Ref. No. 1 thru Ref. No. 158, or said total with the Alternate Bid(s) selected by the Commission, thereby replacing the corresponding Ref. Nos. set forth in the Base Bid.

NOTE: Bidders must complete information requested on the following page.

**STATE OF OHIO**  
**DEPARTMENT OF TRANSPORTATION**  
**SUPPLEMENTAL SPECIFICATION 848**  
**BRIDGE DECK REPAIR AND OVERLAY**  
**WITH CONCRETE USING HYDRO-DEMOLITION**

**October 21, 2011**

<b>848.01</b>	<b>Description</b>
<b>848.02</b>	<b>Bridge Decks with No Existing Rigid Concrete Overlay</b>
<b>848.03</b>	<b>Bridge Decks with an Existing Rigid Concrete Overlay</b>
<b>848.04</b>	<b>Micro-silica Modified Concrete Materials</b>
<b>848.05</b>	<b>Latex Modified Concrete Materials</b>
<b>848.06</b>	<b>Superplasticized Dense Concrete Materials.</b>
<b>848.07</b>	<b>Mixers - Micro-silica Modified or Superplasticized Dense Concrete</b>
<b>848.08</b>	<b>Mixers - Continuous Mobile for Latex Modified Concrete</b>
<b>848.09</b>	<b>Finishing Machine</b>
<b>848.10</b>	<b>Finishing Machine Rail and Supports</b>
<b>848.11</b>	<b>Hydro-demolition Equipment</b>
<b>848.12</b>	<b>Proportioning and Mixing of Micro-silica Modified Concrete</b>
<b>848.13</b>	<b>Proportioning and Mixing of Latex Modified Concrete</b>
<b>848.14</b>	<b>Proportioning and Mixing of Superplasticized Dense Concrete.</b>
<b>848.15</b>	<b>Test Slab</b>
<b>848.16</b>	<b>Protection of the Public</b>
<b>848.17</b>	<b>Removal of Existing Asphaltic Concrete Overlays</b>
<b>848.18</b>	<b>Removal of Existing Concrete Overlays</b>
<b>848.19</b>	<b>Removal of Existing Concrete Overlay, Variable Thickness</b>
<b>848.20</b>	<b>Concrete Removal by Hydro-demolition</b>
<b>848.21</b>	<b>Resounding</b>
<b>848.22</b>	<b>Cleaning</b>
<b>848.23</b>	<b>Full Depth Repair</b>
<b>848.24</b>	<b>Preparation Prior to Overlay Placement</b>
<b>848.25</b>	<b>Finishing Machine Dry Run</b>
<b>848.26</b>	<b>Placing, Consolidating and Finishing</b>
<b>848.27</b>	<b>Curing</b>
<b>848.28</b>	<b>Curing Application LMC Overlays</b>
<b>848.29</b>	<b>Curing Application MSC and SDC Overlays.</b>
<b>848.30</b>	<b>Limitation on Placing Operations</b>
<b>848.31</b>	<b>Sampling and Testing</b>
<b>848.32</b>	<b>Method of Measurement</b>
<b>848.33</b>	<b>Basis of Payment</b>

**848.01 Description.** This work shall consist of furnishing the necessary labor, materials and equipment to repair and overlay concrete bridge decks, backwalls, and approach slabs in accordance with these specifications and in reasonably close conformity with the grades, thickness, and cross sections shown on the plans or as directed by the Engineer. This work shall include the removal of patches other than sound concrete and all loose and unsound concrete by hydro-demolition; preparation

of the sound existing concrete surface; removal, forming and concrete for full-depth repairs; blast cleaning or high pressure water cleaning; furnishing, placing, finishing, texturing and curing of a micro silica modified concrete (MSC) overlay, a latex modified concrete (LMC) overlay, or a superplasticized dense concrete (SDC) overlay, as specified; and all other operations necessary to complete this work according to these specifications and to the satisfaction of the Engineer.

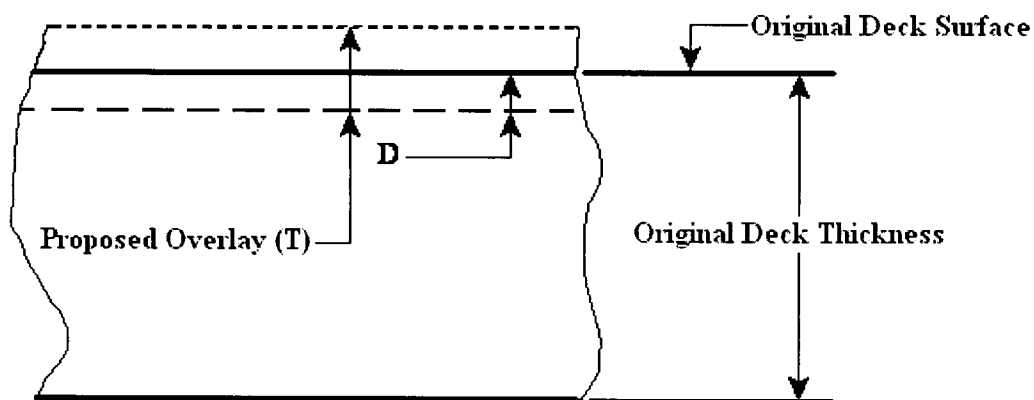
Removal of flexible (asphalt) concrete overlays and rigid concrete overlays are included as part of this work if the following bid items are part of the project plans:

Item 848, Wearing Course Removed, Asphalt,

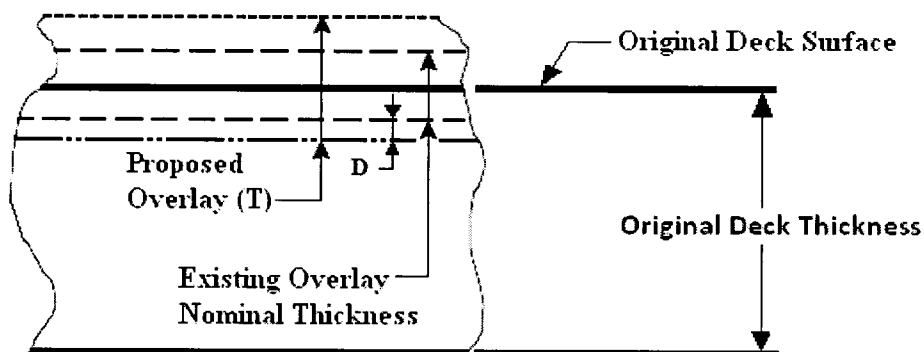
Item 848, Existing Concrete Overlay Removed \_\_\_\_ Nominal Thickness

Item 848, Removal Debonded, Deteriorated Existing Variable Thickness Concrete Overlay

**848.02 Bridge Decks with No Existing Rigid Concrete Overlay.** Remove a uniform depth “D” of the existing deck across its entire surface. Measure “D” according to 848.20. In addition to the uniform removal depth, remove unsound concrete where it is encountered. The finished surface of the proposed concrete overlay shall be a dimension “T” above the bottom of the uniform removal depth.



**848.03 Bridge Decks with an Existing Rigid Concrete Overlay.** Remove the plan specified nominal thickness of the existing concrete overlay. Remove a uniform depth “D” of the existing deck’s original concrete across its entire surface. Measure “D” according to 848.20. In addition to the uniform removal depth, “D”, remove unsound concrete where it is encountered. The finished surface of the proposed concrete overlay shall be a dimension “T” above the bottom of the uniform removal depth.



The cost of removing the rigid concrete overlay shall be included in the price bid for Item 848, Existing Concrete Overlay Removed \_\_\_\_ Nominal Thickness and an additional Item 848, Removal Debonded, Deteriorated Existing Variable Thickness Concrete Overlay. The second bid item is

intended for the removal of unsound variable thickness overlay concrete not removed in the 848, Existing Concrete Overlay Removed, \_\_\_\_ Nominal Thickness.

**848.04 Micro-silica Modified Concrete Materials.** The materials shall conform to the following requirements:

Fine aggregate (natural sand).....	703.02*
Coarse aggregate (No.8) .....	703.02*
Portland cement, Type I or IA .....	701.04** or 701.01
Water.....	499.02
Chemical admixture.....	705.12, ASTM C 494, Type A or D
Air-entraining admixture .....	705.10
Superplasticizing admixture .....	705.12, ASTM C 494, Type F (High Range Water Reducer)
Curing materials.....	705.05 or 705.06, White opaque
Micro-silica admixture.....	701.10

\* Deleterious material shall not exceed one-half the requirement for superstructure aggregate. Sodium sulfate soundness loss shall not exceed that specified for superstructure concrete in 703.02.

\*\* Only one brand of cement shall be used for each bridge deck overlay unless otherwise permitted by the Engineer.

The Contractor will obtain a written statement from the manufacturers of the chemical admixtures verifying the compatibility of the combination of materials and the sequence in which they are combined. The manufacturers will further designate a technical representative from their company or the ready-mix supplier to be in charge of the dispensing of the admixture products. The technical representatives shall act in an advisory capacity and will report to the Contractor and the Engineer any operations and procedures which are considered by the representative as being detrimental to the integrity of the placement. The manufacturer's technical representative will be present during concrete placement unless his presence is waived by the Engineer.

**848.05 Latex Modified Concrete Materials.** The materials shall conform to the following requirements:

Fine aggregate (natural sand) .....	703.02*
Coarse aggregate (No. 8) .....	703.02*
Portland cement, Type I.....	701.04**
Water.....	499.02
Latex emulsion.....	SS No. 953***
Curing materials.....	705.05 or 705.06, White opaque

\* Deleterious material shall not exceed one half the requirement for superstructure aggregate, and the sodium sulfate soundness loss shall not exceed that specified for superstructure concrete in 703.02.

\*\*705.10 admixture shall not be used.

\*\*\*The latex emulsion shall be protected from freezing and prolonged exposure to temperatures in excess of 85 °F (29 °C). Emulsions in storage facilities shall be re-circulated in accordance with the manufacturer's recommendations.

**848.06 Superplasticized Dense Concrete Materials.** The materials shall conform to the following requirements:

Fine aggregate (natural sand).....	703.02*
Coarse aggregate (No. 8) .....	703.02*
Portland cement, Type I or IA** .....	701.04 or 701.01

Water.....	499.02
Chemical admixture.....	705.12, ASTM C 494, Type A or D
Air-entraining admixture .....	705.10
Superplasticizing admixture .....	705.12, ASTM C 494, Type F (High Range Water Reducer)
Curing materials.....	705.05 or 705.06, White opaque

\* Deleterious material shall not exceed one half the requirement for superstructure aggregate, and the sodium sulfate soundness loss shall not exceed that specified for superstructure concrete in 703.02.

\*\* Only one brand of cement shall be used for each bridge deck overlay unless otherwise permitted by the Engineer.

Note: The Contractor shall obtain a written statement from the manufacturer of the superplasticizing admixture that he is satisfied with the compatibility of the combination of materials and the sequence in which they are combined. The manufacturer shall further designate a technical representative from the ready-mix supplier or his company to be in charge of dispensing the admixture products. Operations and procedures which are considered by the designated representative as being detrimental to the integrity of the overlay will not be permitted.

**848.07 Mixers - Micro-silica Modified or Superplasticized Dense Concrete.** Concrete shall be mixed in a central mixing plant or by a ready-mixed concrete truck capable of discharging concrete having a maximum water-cementitious ratio of 0.36. Mixing equipment shall meet the requirements of 499.06(B). Admixtures shall be introduced into the concrete in such a manner that will disperse them throughout the entire load. Batch plants shall meet the requirements of 499.06(A) and shall be located such that the maximum time required from start of mixing to completion of discharge of the concrete at the site of work shall not exceed 90 minutes.

**848.08 Mixers - Continuous Mobile for Latex Modified Concrete.** Requirements for continuous mobile mixers for latex modified concrete are as follows. The proportioning and mixing equipment shall be an integral mobile unit having the capacity and continuous mixing capability to permit the finishing operations to proceed at a constant rate so that final finishing can be completed prior to the formation of a plastic film on the LMC surface. It shall consistently produce a uniformly blended mixture within the specified air content and slump limits. The mixer shall also:

- (1) Be capable of producing not less than 6 cubic yards (4.6 m<sup>3</sup>) of LMC without recharging.
- (2) Be equipped with a recording meter with a ticket printout device to record an indication of the cement quantity being introduced into the mix. The metering device shall be accurate within a tolerance of -1 to +3 percent.
- (3) Be equipped with a latex metering device to indicate volume dispensed. The metering device shall be accurate within a tolerance of -1 to +2 percent. In addition the latex tank shall have a stand pipe marked in gallons (liters).
- (4) Be equipped with a water flow indicator, and have a water flow control that is readily adjustable to provide for minor variations in aggregate moisture content. The flow indicator shall be accurate within a tolerance of + 1 percent in the range of expected use.
- (5) Be equipped with a control to regulate the quantity of each of the LMC components to permit production of a mix having the specified composition. To ensure that the mixer can accurately proportion and blend all components of the LMC on a continuous or intermittent basis, the mixer shall be calibrated prior to the start of the overlay placement.

The Engineer may require re-calibration of the cement, latex, and water metering devices as he deems necessary.

(6) Be capable of discharging mixed LMC through a conventional chute directly in front of the finishing machine.

(7) Be kept clean, free of partially dried or hardened materials, and properly operating at all times.

**848.09 Finishing Machine.** An approved self-propelled finishing machine shall be used with supports outside the prepared deck surface to be overlaid, except where hand finishing equipment is authorized. The finishing machine shall be equipped with forward and reverse drive mechanisms that enable precise velocity control of the machine while it is moving in either direction. It shall be equipped with one or more rotating rollers. It shall be equipped with augers and either a vibrating pan or vibrating rollers. Vibrating frequency for pans and rollers shall be variable from 1500 to 5000 pulses per minute. The Contractor shall furnish the necessary verification of these vibration frequencies. Screeds shall have provisions for raising above the finished concrete surface.

The placing and finishing equipment shall be designed so that the elapsed time between depositing concrete and final finishing shall not exceed 10 minutes.

**848.10 Finishing Machine Rail and Supports.** Finishing machines shall be supported by rail and supports made of steel. Rail shall be furnished in sections not less than 10 feet (3 m) in length and be of sufficient cross-section so that the weight of the finishing machine causes zero vertical deflection while in motion. Rail shall be straight with no sections exceeding a tolerance of 1/8 inch in 10 feet (3 mm in 3.0 m) in any direction. Rail supports shall be screw-type adjustable saddles and shall be of sufficient number under the rail so that zero vertical deflection occurs under the weight of the finishing machine.

**848.11 Hydro-demolition Equipment.** The hydro-demolition equipment shall be a self-propelled machine that utilizes a high pressure water jet stream capable of removing concrete to the depth specified herein and/or as shown on the plans and be capable of removing rust and concrete particles from reinforcing steel. Hand held high pressure [10,000 psi (690 bar) minimum] wands or 35 lb (16 kg) maximum jackhammers operated at no more than a 45 degree angle from horizontal shall be used in areas that are inaccessible to the self-propelled machine or in patching areas that require work to remove the remaining unsound concrete.

**848.12 Proportioning and Mixing of Micro-silica Modified Concrete.** All required characteristics of the mix, i.e. air entrainment and slump, shall be adjusted off the deck before placement of the overlay begins. The components of the micro silica modified concrete shall be combined into a workable mixture of uniform composition and consistency. They shall be proportioned as follows:

**QUANTITIES OF MATERIAL PER CUBIC YARD (CUBIC METER) (DRY WEIGHTS)\***

Type of Coarse Aggregate	Coarse Aggregate lb (kg)	Fine Aggregate lb (kg)	Cement lb (kg)	Micro Silica lb (kg)	Max. Water Cementitious Ratio^^
Gravel	1355 (805)	1355 (805)	700 (415)	50 (30)	0.36
Limestone	1370 (815)	1355 (805)	700 (415)	50 (30)	0.36
Slag	1190 (705)	1355 (805)	700 (415)	50 (30)	0.36

\* The specific gravities used for determining the above weights are: natural sand 2.62, gravel 2.62, limestone 2.65, slag 2.30 and micro silica 2.20.

^^ The water cementitious ratio shall be calculated based upon the total cementitious material. Cementitious material shall include Portland cement and microsilica (solids).

The proportions of coarse and fine aggregate shall be adjusted to provide the maximum amount of course aggregate possible and still provide a workable and finishable mix. The Contractor may modify

the mixes shown by adjusting the coarse and fine aggregates up to 100 pound (50 kg) each, unless otherwise approved by the Engineer.

The batch weights previously described shall be corrected to compensate for the moisture contained in the aggregate at the time of use. A chemical admixture (705.12, Type A or D) shall be used. The transit mixer charge shall be limited to 3/4 of its rated capacity or 6 cubic yards (4.6 cubic meters), whichever is the smaller, unless a larger size is approved by the Engineer.

The specified cementitious content shall be maintained and a maximum water-cementitious material ratio of 0.36 shall not be exceeded. Any admixture added at the job site shall be mixed a minimum of 5 minutes at mixing speed. After all components have been added, the slump range shall be 6 inches (150 mm) plus or minus 2 inches (50 mm). The air content of plastic concrete at the time of placement shall be 8 plus or minus 2 percent.

The use of Micro-silica admixture in dissolvable bags shall not be allowed.

If a slump loss occurs after mixing and before placement, the charge may be retempered with the admixture to restore plasticity. The slump range and air content shall be rechecked to ensure conformance to the allowable values. The load shall still be placed within the 90 minute limitation as per 848.07. If the consistency of the charge after retempering is such as to cause segregation of the components, this will be cause for rejection of the load.

**848.13 Proportioning and Mixing of Latex Modified Concrete.** Prior to each day's placement, each mixer shall be checked to assure that specified air content, slump and yield have been attained. Trial concrete shall not be incorporated into the work. Additional testing will be done in accordance with 848.31.

The LMC shall be a workable mixture having a uniform composition and consistency with the following proportions, properties or limits:

**QUANTITIES OF MATERIALS PER CUBIC YARD (CUBIC METER)(DRY WEIGHT)\***

Type of Coarse Aggregate	Fine Aggregate lb (kg)**	Coarse Aggregate lb (kg)	Cement lb (kg)	Latex Emulsion gal (L)	Maximum Net Water gal (L)
Gravel	1645 (974)	1300 (769)	658 (389)	24.5 (121)	17.5 (86)
Limestone	1645 (974)	1315 (778)	658 (389)	24.5 (121)	17.5 (86)
Slag	1645 (974)	1140 (675)	658 (389)	24.5 (121)	17.5 (86)

Slump\*\*\* ..... 4 to 6 inches (100 to 150 mm)

Air content of plastic mix shall not exceed 7 percent.

\* The specific gravities used for determining the above weights are: natural sand 2.62, gravel 2.62, limestone 2.65 and slag 2.30.

\*\* The dry weights are approximate. This proportion should produce good workability, but due to gradation variability, the fine aggregate content may be increased, with approval by the Engineer, as much as 8 percent by weight if the coarse aggregate is reduced an equal volume.

\*\*\* The slump shall not be measured until after the concrete has been discharged from the mixer and left undisturbed for 4 to 5 minutes. The water content may be adjusted to control the slump within the prescribed limits.

**848.14 Proportioning and Mixing of Superplasticized Dense Concrete.** The SDC mix shall be proportioned and mixed in accordance with 499 of the CMS except as modified herein.

All required characteristics of the mix, i.e. air entrainment and slump, shall be adjusted off the deck before placement of the overlay begins. The components for superplasticized dense concrete shall be combined into a workable mixture of uniform composition and consistency. They shall be proportioned as follows:

**QUANTITIES OF MATERIAL PER CUBIC YARD (CUBIC METER), DRY WEIGHTS\***

Type of Coarse Aggregate	Coarse Aggregate lb (kg)	Fine Aggregate lb (kg)	Cement lb (kg)	Maximum Water-Cement Ratio
Gravel	1300 (769)	1300 (769)	825 (489)	0.36
Limestone	1315 (778)	1300 (769)	825 (489)	0.36
Slag	1140 (675)	1300 (769)	825 (489)	0.36

\* The specific gravities used for determining the above weights are: natural sand 2.62, gravel 2.62, limestone 2.65 and slag 2.30.

The batch weights previously described shall be corrected to compensate for the moisture contained in the aggregate at the time of use. A chemical admixture (705.12, Type A or D) shall be used. The transit mixer charge shall be limited to 3/4 of its rated capacity or 6 cubic yards (4.6 m<sup>3</sup>), whichever is the smaller, unless a larger size is approved by the Engineer.

The specified cement content shall be maintained and a maximum water-cement ratio of 0.36 shall not be exceeded. If superplasticizing admixture is added at the job site, the load shall be mixed a minimum of 5 minutes at mixing speed. After all of the superplasticizer has been added, the slump range shall be 6 ± 2 inches (150 ± 50 mm). The air content of fresh unvibrated SDC at the time of placement shall be 8 ± 2 percent. Three 4" x 8" cylinders shall be made for every 50 cubic yards of SDC incorporated into the work.

If a slump loss occurs after addition and mixing of the superplasticizing admixture and before placement of the SDC overlay, the charge may be "re-tempered" with the admixture to restore plasticity. The slump range and air content shall be rechecked to ensure conformance to the allowable values. If the consistency of the charge after "re-tempering" is such as to cause segregation of the components, this will be cause for rejection of the load.

**848.15 Test Slab.** At the option of the Engineer, the Contractor shall make one or more trial batches of overlay material of the size to be hauled at least 4 days before the overlay is to be placed. He shall cast one or more small test slabs demonstrating the ability to finish and texture the concrete in accordance with 848.26. These slabs shall be 8 feet (2.4 m) long, a width which is wide enough to accommodate the tinning equipment and 1 1/4 inch (32 mm) thick.

**848.16 Protection of the Public** No operations without reasonably available engineering controls that limit fugitive dust will be acceptable.

The Contractor shall be aware that there are state, regional, and local government agencies throughout the State that have requirements regarding control of dust generated by the blasting operation.

The Contractor is responsible for protecting traffic under and adjacent to the work on the bridge while removing deck concrete.

**848.17 Removal of Existing Asphaltic Concrete Overlays.** If an item "848, Wearing Course Removed, Asphalt" is specified in the plans, the Contractor shall remove the existing asphaltic concrete course to the original concrete deck and any waterproofing material that was part of the deck. Removal shall comply with the requirements of CMS 202 and be completed before hydro-demolition is



performed. Do not perform additional scarification after the removal of the existing overlay. This item shall be a separate operation from 848.18.

**848.18 Removal of Existing Concrete Overlays.** If an item “848, Existing Concrete Overlay Removed \_\_\_\_ Nominal Thickness” is specified in the plans, the Contractor shall remove the existing concrete overlay to the nominal specified thickness. Removal shall comply with the requirements of CMS 202 and as amended below:

Nominal thickness is defined as the specified thickness +/- 1/4 inch (6 mm).

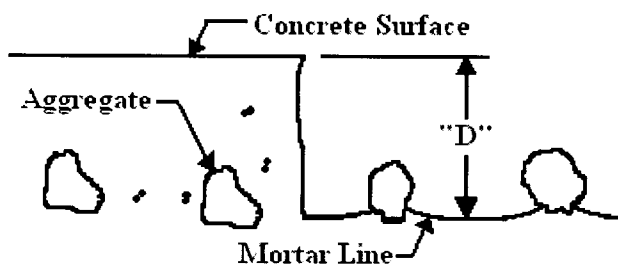
If the Engineer determines during the nominal thickness removal that not enough existing concrete overlay is removed to expose only variable thickness existing concrete overlay islands, the Engineer will require the Contractor to adjust the removal depth, as required, until only variable thickness islands of concrete overlay are visible. Do not perform additional scarification after the removal of the existing overlay.

**848.19 Removal of Existing Concrete Overlay, Variable Thickness.** If an item “Item 848, Removal Debonded, Deteriorated Existing Variable Thickness Concrete Overlay” is specified in the plans the Contractor shall perform the following:

After removing the existing uniform concrete overlay, the Contractor shall clean the deck to allow sounding. With Contractor supplied aerosol paint, the Engineer shall sound and mark the areas of unbonded variable thickness existing concrete overlay for removal. The Contractor shall remove by chipping all obviously loose, debonded and/or deteriorated concrete overlay (variable thickness). Chipping hammers shall not be heavier than the nominal 35 pound (16 kg) class and shall be operated at an angle of less than 45 degrees from the deck surface. Concrete shall be removed in a manner that prevents cutting, elongating or damaging reinforcing steel. Any reinforcing steel damaged shall be replaced at the Contractor’s expense. Upon the Engineer’s approval of the removal of the marked areas, Concrete Removal by Hydro-demolition 848.20 may be performed.

**848.20 Concrete Removal by Hydro-demolition.** The intent of this specification is to remove all unsound concrete, both uniform and variable depth, by using hydro-demolition, not scarification or jacking.

The entire top surface of the concrete bridge deck shall be completely removed to a minimum depth “D” of 1 inch (25 mm) or as specified in the plans. This measurement shall be taken from the Portland cement concrete surface, immediately prior to the hydro-demolition removal, to the mortar line.



For bridges without either an asphalt wearing course or an existing concrete overlay removal pay item, the Contractor may choose to use conventional scarifying equipment to make an initial pass across the deck to remove a maximum of 1/4 inch (6mm), or as specified in the plans. Increase the uniform overlay thickness, “T” to account for the scarified removal depth. In all cases the final 1 inch will be removed using hydro-demolition equipment. If the Contractor’s choice of using mechanical scarifying equipment results in exposing or snagging the top mat of reinforcing steel, the scarifying equipment shall be immediately stopped.

Damaged or dislodged reinforcing steel shall be repaired or replaced at the Contractor's expense. Replacement shall include the removal of any additional concrete required to position the new reinforcing steel at the correct height and to provide the required lap splice lengths as defined in 509.

Prior to the commencement of the removal operation with hydro-demolition, the equipment shall be calibrated on an area of sound concrete as designated by the Engineer. In case of an existing overlay, calibration shall be performed on original deck concrete that is sound and not on any remaining concrete overlay material. After calibration, the equipment shall be moved to a known unsound area to verify that all unsound concrete is removed by the established recorded settings.

The Engineer shall verify the following settings:

1. Water pressure gauge
2. Machine staging control (step)
3. Nozzle size
4. Nozzle speed (travel)

During the calibration, any or all of the above settings may be modified in order to achieve removal of all unsound concrete. The settings may be changed by the Contractor to achieve total removal of unsound concrete, but the Engineer must be notified of all changes. The Engineer may change any or all of the settings in order to achieve the goal of removing unsound concrete with hydro-demolition. The removal shall be verified, as necessary, and at least every 30 feet (10 m) along the cutting path. The readings shall be documented and, if necessary, the equipment re-calibrated to insure the goal of removing all unsound concrete with hydro-demolition is achieved.

Calibration shall be required on each structure, each time hydro-demolition is performed and as required to achieve the results specified by the plan. The depth of removal shall be verified as necessary, and at least every 30 feet (10 m) along the cutting path. The readings shall be documented and, if necessary, the equipment re-calibrated to insure the specified depth of removal.

The Contractor shall provide shielding, as necessary, to ensure containment of all dislodged concrete within the removal area in order to protect the traveling public from flying debris both on and under work site. Contain, collect, quantify, characterize and legally dispose of all wastewater and sludge generated during Surface Preparation using Hydro-demolition. Manage all wastewater and sludge in accordance with ORC Chapter 6111 and all other laws, regulations, permits and local ordinances relating to this waste. Submit a wastewater and sludge management plan to the Engineer signed by an authorized representative of the Contractor certifying compliance with the Ohio Water Pollution Control Act prior to beginning surface preparation using Hydro-demolition. The plan shall describe how the work will comply with ORC Chapter 6111 and all other applicable laws, regulations, permits and local ordinances relating to this waste. The contractor is required to include in the plan, a pH control component that will monitor and prevent the formation of wastewater with a pH above 11.5. Ensure that all pH monitoring is consistently representative of the wastewater being generated. In the event that the wastewater pH exceeds the regulatory hazardous threshold of 12.5, the contractor is required to immediately stop the operation and notify the engineer. The contractor is responsible for all fines or liens assessed by any regulatory agency having jurisdictional authority over the disposal of hazardous waste. The contractor is responsible for all costs associated with handling, managing and disposing of all hazardous waste.

Measure and record all wastewater pH with a pH meter equipped with a standard pH probe. Ensure that the pH meter can accurately measure the pH from 0.00 to 14.00. Calibrate and operate the pH meter in accordance with the Manufacturer's Recommendations and the *Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices*

([http://www.epa.state.oh.us/portals/35/documents/Field\\_Manual\\_1-9-09\\_revision.pdf](http://www.epa.state.oh.us/portals/35/documents/Field_Manual_1-9-09_revision.pdf)).

At the conclusion of the hydro-demolition operation, provide the Engineer with a daily record of all calibration and pH measurements.

Hydro-demolition wastewater disposal options include:

1. Recycling at a facility that has a use for the wastewater and can provide verification and manifests that document that the waste was legally recycled.
2. NPDES Permitted Facility that is permitted to accept the waste. Provide verification and manifests that document that the waste was legally discharged at the NPDES Permitted facility. The NPDES Facility's controlling authority may impose additional requirements prior to permitting the wastewater discharge into facility's system.
3. Land application on public right-of-way in compliance with the Ohio EPA General Wastewater Disposal System Permit To Install For Hydro-demolition wastewater. This disposal option is only available when the contract identifies the specific disposal location in the plans.

If a land application disposal location is identified in the contract documents, and the contractor chooses to land apply the wastewater, the contractor shall file the OEPA Notice Of Intent (NOI) for "General Wastewater Disposal System Permit To Install For Land Application of Hydro-demolition Wastewater" (Ohio EPA Permit No. 3745-42-HD001), prior to any wastewater land application activities. Adjust the pH to between 5 and 9 prior to discharging the wastewater during the land application operation.

*The "General Wastewater Disposal System Permit To Install For Land Application of Hydro-demolition Wastewater," and related information can be found at [www.epa.ohio.gov/dsw/pti/PTIGeneralPermits.aspx](http://www.epa.ohio.gov/dsw/pti/PTIGeneralPermits.aspx).*

All costs related to, handling, characterization and disposal of all wastes associated with the hydro-demolition work are incidental to Surface Preparation using Hydro-demolition wastewater. Provide the Engineer with documentation verifying that the waste was legally disposed of in accordance with the applicable regulations. For projects using land application disposal, provide the Engineer with a copy of the fully executed OEPA Notice of Termination within 15 working days following the completion of land application disposal.

**848.21 Resounding.** After the hydro-demolition operation has completed the removal, and the deck is allowed to dry, the deck shall be resounded to assure that all unsound material has been removed. The final sounding of the deck shall be done by the Engineer and shall not be performed within 24 hours after a rain. In no case shall the final sounding be made unless the deck is dry. Final sounding shall consist of as many successive resoundings as required to ensure that all deteriorated and fractured concrete has been removed. Additional removal shall be performed with the hand held wand [10,000 psi (690 bar) min] or 35 pounds (16 kg) maximum weight jackhammer operated at an angle of no more than 45 degrees from horizontal. If jackhammering results in the exposure of 1/2 of the reinforcing steel, the adjacent concrete shall be removed to a depth that will provide a minimum 3/4 inch (19 mm) clearance around the reinforcing steel except where other reinforcing steel makes this impractical.

Aerosol spray paint for outlining shall be provided by the Contractor.

**848.22 Cleaning.** Cleaning shall be performed with a vacuum system capable of removing wet debris and water all in the same pass. Cleaning shall be done in a timely manner, before debris and water is allowed to dry on the deck surface. All exposed reinforcing steel which is left unsupported by the hydro-demolition process shall be adequately supported and protected from bending from all construction traffic.

All reinforcing steel damaged or dislodged by these operations shall be replaced with bars of the same size and coating at no additional cost to the State. Replacement shall include the removal of any additional concrete required to position the new reinforcing steel at the correct height and to supply the required lap splice lengths as defined in 509.

**848.23 Full Depth Repair.** Where the deck is sound for less than one half of the original deck thickness, the concrete shall be removed full depth except for limited areas as may be designated by the Engineer. Forms shall be provided to support concrete placed in full-depth repair areas. The forms for areas of up to 4 square feet (0.4 square meter) may be suspended from wires from the reinforcing steel. For areas greater than 4 square feet (0.4 square meter), the forms shall be supported from the primary members of the superstructure or by shoring from below. Areas of full-depth repair shall have the concrete faces and reinforcing steel cleaned as described in 848.24

**848.24 Preparation Prior to Overlay Placement.** Not more than 24 hours prior to placing the overlay, all surfaces to which the overlay is to bond, including exposed reinforcing and structural steel, the work face of a previously placed overlay, and the faces of curbs and barriers up to a height of at least 1 inch (25 mm) above the proposed overlay surface shall be blast cleaned. Exposed reinforcing and structural steel shall be cleaned to remove all loose and built-up rust, asphalt residue, and all other contaminants detrimental to achieving an adequate bond. Pockets of rust (corrosion cells) on exposed reinforcing steel shall be cleaned of all corrosion products. Areas of steel where the original hydroblasting was applied should normally be adequately cleaned but steel shall be inspected to assure cleanliness requirements are met. Suitable blast methods may include high pressure water blasting [10,000 psi (690 bar) min], water blasting [less than 10,000 psi (690 bar)] with abrasives in the water, abrasive blasting with containment, or vacuum abrasive blasting. Listed concrete surfaces shall be made free of spalls, lath, and all contaminants detrimental to achieving an adequate bond. Conduct this work in compliance with section 848.20.

Provide the Engineer with documentation verifying that all the waste was collected and legally disposed of in accordance with the applicable regulations.

Bridge scuppers shall be cleaned of all foreign matter and plugged prior to placement of the overlay. Scuppers shall be unplugged to permit free drainage of water from the deck surface following overlay placement.

Vehicles other than approved construction equipment will not be permitted on those sections of the deck where hydro-demolition has begun. Contamination of the deck by construction equipment or from any other source shall be prevented.

**848.25 Finishing Machine Dry Run.** After the screed rails have been set to proper profile and prior to placing the overlay, the Contractor shall check the finishing machine clearance to assure the Engineer that the specified nominal thickness of overlay will be attained over the entire deck.

**848.26 Placing, Consolidating and Finishing.** The deck surface which will contact the overlay shall be cleaned with compressed air, wetted, and kept wet for at least one hour immediately prior to placing the overlay. Any standing water shall be removed prior to placement of the overlay. The newly exposed surfaces in full-depth repair areas shall be similarly cleaned and prepared immediately prior to placing concrete.

Overlays shall be placed, consolidated and finished to the plan surface. Hand vibrators shall be used for full-depth repair, variable depth areas, at all edges and adjacent to joint bulkheads.

Concrete for full-depth repairs shall be the overlay concrete placed either simultaneously with the overlay or, if preplaced separately from the overlay operation, the concrete may be either the overlay concrete or 511 Class S Concrete. If the full-depth repair is preplaced separately, it shall be placed up to the plan lower boundary of the overlay, given a broom finish, and cured as specified in 511.17.

Contamination of the wetted deck by construction equipment or from any other source shall be prevented by placement of a clean 4-mil (100  $\mu$ m) polyethylene sheet (or any other covering as approved by the Engineer) on the surface of the prepared deck.

Where reinforcing steel is exposed, the Contractor shall provide adequate supports for the concrete mixer so that reinforcing steel and its bond with the concrete will not be damaged by the weight and movement of the concrete mixer, or shall provide means to convey concrete from the mixer to the finishing machine.

After the overlay material has been consolidated finished and cured, it shall be sawed longitudinally per 511.20.

At the Contractor's option an evaporation retardant may be used after finishing. This material shall not be finished into the plastic concrete at any time. Only products specifically marketed for such usage shall be utilized. The evaporation retardant shall be applied as per the manufacturer's written recommendations and shall consist of a fine mist using a suitable sprayer. Application in a stream shall not be allowed. The wet burlap cure, 848.28 or 848.29, shall follow this operation as closely as possible.

The Contractor shall stencil the date of construction (month and year) and the letters MS, LM or SD into the overlay before it takes its final set. The date shall be located in the right-hand corner of the deck at the forward abutment. It shall be placed parallel to the edge of the overlay and centered at 12 inches (300 mm) in from both the edge of the overlay and end finish. The numerals shall be 3 to 4 inches (75 to 100 mm) in height, 1/4 inch (6 mm) in depth and face the centerline of the roadway.

Longitudinal joints are permitted, but only to the extent necessary to accommodate the width of the finishing machine, to facilitate changes in roadway crown, and to permit maintenance of vehicular traffic, except as approved by the Engineer. Longitudinal joints shall not be used in close proximity to faces of curbs or barriers or at edges of decks. All joints in the overlay shall be formed.

Any ponding problem which is noted prior to final acceptance of the overlay shall be corrected by the Contractor at no cost to the State.

A 10 foot (3 meter) straightedge shall be used to check the overlay directly behind the finishing machine. It shall also be used to check transversely along the edges of the overlay where hand finishing is done. Any irregularities exceeding 1/8 inch in 10 feet (3 mm in 3 m) shall be corrected immediately.

Contractor is required to designate areas for concrete truck washout and required to restore these areas following concrete placement. Compensation for the concrete washouts is incidental to the concrete work.

**848.27 Curing.** If a full-depth repair is placed separately, it shall be water-cured as described below for the applicable overlay concrete and shall have attained a modulus of rupture of 400 psi (2.8 MPa).

A cure day shall be defined as a 24-consecutive hour period of time. The temperature of the overlay surface shall be maintained above 35 °F (2 °C) until the curing period is completed. Any day during which the air temperature at the overlay surface falls below 45 °F (7 °C) shall not be counted as a cure day.

When curing and grooving are completed, all joints and abutting surfaces in the overlay shall be sealed with an approved high molecular weight methacrylate sealer meeting 705.15. The sealer shall be prepared and applied in accordance with the manufacturer's recommendations. Joints to be sealed shall include transverse joints in the overlay concrete, joints between overlay concrete and steel enddams, longitudinal joints between overlay concrete placements, and longitudinal joints between overlay concrete and safety curb, barriers, parapets, bulb angles, etc. In the edges of decks without curbs, the interface between the overlay and the existing deck shall be sealed in a similar manner. Any cracking

which occurs prior to opening to traffic shall be sealed as above or repaired or corrected in another manner as directed by the Engineer at no cost to the State. The deck shall be sounded and any delaminated area shall be removed and replaced at the Contractor's expense.

Any improperly cured overlay may be ordered to be removed and replaced at no cost to the State. Curing shall start after the concrete has been finished and the surface will not be damaged by the cure.

**848.28 Curing Application LMC Overlays.** As soon as the finishing operation is completed, the finished overlay surface shall be covered with a single layer of clean wet burlap. The burlap shall be kept wet by a continuous flow of water through soaker hoses and covered with a 4-mil (100  $\mu$ m) white opaque polyethylene film or a wet burlap - white opaque polyethylene sheet for 48 hours. After this initial wet curing period, the covering shall be removed and the surface dry-air cured for an additional 2 days before subjecting the new surface to vehicular traffic.

Traffic will not be permitted on the finished overlay surface until after completion of the 4-day cure.

**848.29 Curing Application MSC and SDC Overlays.** As soon as the finishing operation is completed, the finished overlay surface shall be covered with a single layer of clean wet burlap. The fresh overlay surface shall receive a wet burlap cure for 3 days. For the entire curing period of 72 hours the burlap shall be kept wet by the continuous application of water through soaker hoses. Either a 4-mil (100  $\mu$ m) white opaque polyethylene film or a wet burlap-white opaque polyethylene sheet shall be used to cover the wet burlap for the entire 72 hour period.

Traffic will not be permitted on the finished overlay surface until after completion of the 3 day wet cure.

**848.30 Limitation on Placing Operations.** Prior to overlay placement, the Contractor shall establish their ability to place the overlay on a continuous basis and to consolidate and finish prior to the formation of plastic surface film, and commence curing.

When directed by the Engineer, a representative of either the latex manufacturer or the micro-silica supplier shall be present during the proportioning, mixing, placing and finishing of the overlay. Operations and procedures which are considered by this representative to be detrimental to the integrity and durability of the repaired and overlaid bridge deck will not be permitted.

Once the finishing machine has made the first pass, workers shall not be allowed to walk in the freshly placed overlay.

No overlay concrete shall be placed when it is raining, when the ambient air temperature is below 45 °F (7 °C) or when it is predicted to fall below 45 °F (7 °C) for the duration of the curing period.

Overlays shall be placed only when the overlay surface evaporation rate, as affected by ambient air temperature, concrete temperature, deck temperature, relative humidity and wind velocity, is 0.1 pound per square foot (0.5 kg/m<sup>2</sup>) per hour or less. The Contractor shall determine and document the atmospheric conditions, subject to verification by the Engineer. No overlay concrete shall be placed if the ambient air temperature is 85 °F (29 °C) or greater or predicted to go above 85 °F (29 °C) during the overlay placement regardless of the surface evaporation rate.

Figure 1 in ACI 308 (see 511.10) shall be used to determine graphically the loss of surface moisture for the overlay. In no case shall the temperature of the overlay concrete exceed 85 °F (29 °C) during placement. The measurement of weather parameters shall be made within 10 feet (3 m) of the placement area. Do not schedule overlays to be placed for the time period from October 16th to March 31st.

If placement of the overlay is to be made at night, the Contractor shall submit a plan which provides adequate lighting for the work area. The plan shall be submitted at least 15 calendar days in advance.

and be approved by the Engineer before concrete is placed. The lights shall be so directed that they do not affect or distract approaching traffic.

During delays in the overlay concrete's placement operations of more than 10 minutes and/or when a plastic surface film develops on a LMC overlay, the work face of the overlay shall be temporarily covered with wet burlap. If an excessive delay is anticipated, a bulkhead shall be installed at the work face and the overlay placement operation terminated.

Unless otherwise authorized by the Engineer, an overlay shall not be placed adjacent to a previous overlay which has cured for less than 36 hours.

Adequate precautions shall be taken to protect the freshly placed overlay from rain.

Vehicles other than approved construction equipment will not be permitted on those sections of the deck where concrete removal operations have begun. Contamination by construction equipment or from any other source shall not be permitted.

Prior to the end of the full curing period for any section, no power driven tools heavier than a 15 pound (7 kg) chipping hammer shall be used adjacent to the new overlay.

**848.31 Sampling and Testing.** After each charging of the concrete mixing unit (LMC) or transit mixer (MSC or SDC), the following testing shall be performed by the Department: Testing shall be performed at the point of discharge onto the deck.

a. Slump

4 to 6 inches (100 mm to 150 mm)(LMC)

6 +/- 2 inches (150 mm +/- 50 mm)(MSC or SDC)

b. Unit weight

c. Air

7% max. (LMC)

8% +/- 2% (MSC or SDC)

d. Compressive strength cylinders shall be made for every 50 cubic yards (40 cubic meters)

The Contractor shall furnish the required materials and samples without charge to the State as per 106.02.

For LMC, with all controls set for the desired mix, activate the mixer and discharge the mixed material into a 1/4 cubic yard (0.25 m<sup>3</sup>) container 36 x 36 x 9 inches (1 x 1 x 0.25 m). When the cement recording meter indicates a discharge of 1 3/4 bags (97 kg) of cement or 1/4 cubic yard (0.25 m<sup>3</sup>), the container should be filled flush with consolidated LMC. This test will be accepted as evidence of satisfactory performance for each truck.

**848.32 Method of Measurement.** Wearing Course Removed, Asphalt shall be measured as the actual square yards (square meters) of existing asphalt wearing course and waterproofing material removed and shall include all labor, materials, equipment required to complete the work.

Existing Concrete Overlay Removed \_\_\_\_ Nominal Thickness shall be measured as the actual square yards (square meters) of existing concrete overlay removed and shall include all labor, materials, and equipment required to complete the work.

Removal Debonded, Deteriorated Existing Variable Thickness Concrete Overlay shall be measured as the actual square yards (square meters) of marked removal areas defined in 848.19, and shall include all labor, materials, equipment, paint, to remove unsound variable thickness concrete overlays before hydro-demolition.

For measurement of quantities, the overlay is divided by a horizontal plane into two items, consisting of an upper part of uniform thickness "\_\_\_\_\_ Concrete Overlay Using Hydro-demolition (\_\_\_\_ inches (mm) thick)" and a lower part of variable thickness "\_\_\_\_\_ Concrete Overlay (Variable Thickness), Material Only". "Full-Depth Repair with \_\_\_\_\_ Concrete" is measured as an additional separate pay item.

\_\_\_\_\_ Concrete Overlay using Hydro-demolition (\_\_\_\_ inches (mm) thick) shall be measured as the actual area in square yards (square meters) overlaid. The thickness shall be uniform as defined in 848.02 and 848.03 plus the depth removed by scarification in 848.20. The bid price for this item includes the cost of furnishing, placing, finishing, texturing and curing the overlay. Placement shall also include all labor and equipment to place the variable thickness overlay (since the variable thickness and the uniform thickness overlay are placed in one operation).

Surface Preparation Using Hydro-demolition shall be measured as the actual deck area in square yards (square meters) overlaid and shall include the cost of surface preparation, hydro-demolition, milling, removal of the surface preparation debris, cleaning, and all other materials, labor and equipment required to complete this work, but not specifically included in the other items for payment.

Full-Depth Repair, as defined by 848.23, shall be measured as the volume in cubic yards (cubic meters) based on the measured area of full-depth openings in the deck and the existing slab thickness, below uniform removal depth "D".

\_\_\_\_\_ Concrete Overlay (variable thickness), Material Only, shall be the volume in cubic yards (cubic meters) measured as the difference between the total volume (as indicated by the batch quantity tickets for the ready-mix trucks) of overlay placed and accepted, less the calculated volume of the overlay concrete (plan specified uniform thickness plus the depth removed by scarification in 848.20), less the volume of overlay concrete used for full-depth repair, and less any wasted overlay concrete. The volume of overlay concrete remaining in the drum of the last ready-mix truck shall be weighed or measured by the Engineer. The bid price for this item includes the cost of material only, furnished to the job site. No separate payment shall be made for the placement of the concrete or for any tools, labor, equipment or incidentals necessary for such placement complete and in conformance with these notes. The intent of this item is to pay material costs only for all materials, other than uniform thickness overlay material, regardless of the depth of removal incurred and including any material required for grade correction.

Concrete for the test slabs required by 848.15 shall be paid for on a lump sum basis. All other concrete for testing purposes shall be furnished without charge to the department per 106.02.

Hand chipping shall be based on the square yards (square meters) of material removed regardless of depth. Included shall be all labor and equipment required to remove unsound concrete by jackhammer or hand held wand in accordance with 848.21 and to clean the surface and remove debris accumulated as part of this operation. Hand chipping for areas other than those included in 848.21 shall be incidental to surface preparation using hydro-demolition.

#### **848.33 Basis of Payment.**

The Department will consider the plan development, containment, collection, and the disposal of the hydro-demolition wastewater as incidental to Surface Preparation using Hydro-demolition.

The Department will consider the cost of furnishing and installing forms and supports, furnishing and placing the overlay concrete and if the full-depth repair is preplaced, the finishing and curing required as incidental to Full-Depth Repair.

Payment for completed and accepted quantities as measured above will be made at the contract price bid for:

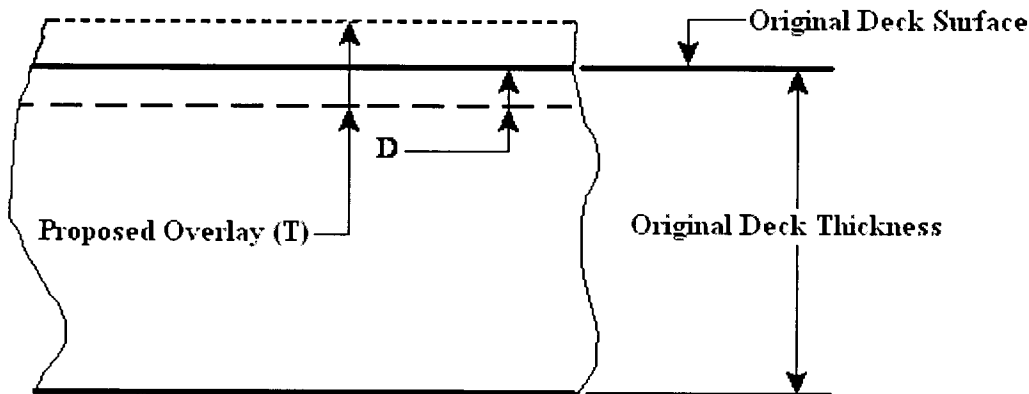


<b>Item</b>	<b>Unit</b>	<b>Description</b>
848	Square yard (square meter)	Micro-silica Modified Concrete Overlay using hydro-demolition [___ inch (mm)] thick
848	Square yard (square meter)	Latex Modified Concrete Overlay using hydro-demolition [___ inch (mm)] thick
848	Square yard (square meter)	Superplasticized Dense Concrete Overlay using hydro-demolition [___ inch (mm)] thick
848	Square yard (square meter)	Surface preparation using hydro-demolition
848	Cubic yard (cubic meter)	Micro-silica Modified Concrete Overlay (variable thickness), material only
848	Cubic yard (cubic meter)	Latex Modified Concrete Overlay (variable thickness), material only
848	Cubic yard (cubic meter)	Superplasticized Dense Concrete Overlay (variable thickness), material only
848	Lump sum	Test slab
848	Cubic yard (cubic meter)	Full-depth repair
848	Square yard (square meter)	Wearing course removed, asphalt
848	Square yard (square meter)	Existing concrete overlay removed ___ nominal thickness
848	Square yard (square meter)	Hand Chipping
848	Square yard (square meter)	Removal debonded or deteriorated existing variable thickness concrete overlay

## **Designer's Note for Supplemental Specification 848:**

### **For Bridge Decks with No existing Rigid overlay**

1. Where possible, the designer should identify a location for the disposal of hydrodemolition wastewater that is compliant with the Ohio EPA General Wastewater Disposal System Permit To Install (PTI) For Land Application Of Hydro-Demolition Wastewater. Size the area using a maximum application rate of 10,000 gal/acre and a typical hydro-demolition wastewater generation rate of 75 gallons per square yard of deck area overlaid. If a suitable disposal location exists, the contract plans shall include:
  - a. A Location Map to the disposal site (if the disposal site is not located within the project limits)
  - b. A site plan of the disposal site showing the location of all hydraulic features, buffers, water wells, storm sewers, catch basins, and other site features restricted by the permit in land application areas
2. Plans shall include a plan view showing the overlay limits.
3. Plans shall include a cross-section of the deck showing:
  - a. Finished height "T" (see section 848.02) of the MSC, SDC or LMC concrete overlay above the bottom of the uniform removal depth.
  - b. Uniform removal depth "D" (see section 848.02).
  - c. Thickness of asphalt wearing course, if applicable.
  - d. Original deck thickness.



4. Plans shall include an Estimated Quantities Table with the following bid items:
  - a. If an asphaltic overlay is on the concrete bridge deck a bid item is required  
848 Square yard    Wearing course removed, asphalt
  - b. Specify the overlay. Include type (LMC, SDC or MSC), thickness ("T" ) and quantity in square yard (square meter).  
848 Square yard    \_\_\_\_\_ Concrete overlay using hydro-demolition [\_\_\_\_inch (mm)] thick  
(square meter)
  - c. Specify the removal quantities in square meter  
848 Square yard    Surface preparation using hydro-demolition  
(square meter)

- d. Specify the variable thickness quantity required. The variable thickness quantity is the amount of proposed overlay material below the uniform removal depth "D". Quantity shall be based on required bridge deck survey and evaluation required in section 400 of the Bridge Design Manual. Additionally type of overlay concrete (LMC, SDC or MSC) shall be specified.

848 Cubic yard \_\_\_\_\_ Concrete overlay (variable thickness), material only  
(cubic meter)

- e. A nominal quantity of hand chipping shall be specified. Recommend 10% of the estimated variable thickness area of the deck (If 30% of deck is considered to require variable thickness repair the  $30 \times .10 = 3\%$  of deck square yardage would be specified for hand chipping. Other methods for quantities that have been developed are acceptable.

848 Square yard \_\_\_\_\_ Hand chipping  
(square meter)

- f. Test Slab bid item shall be included for all projects

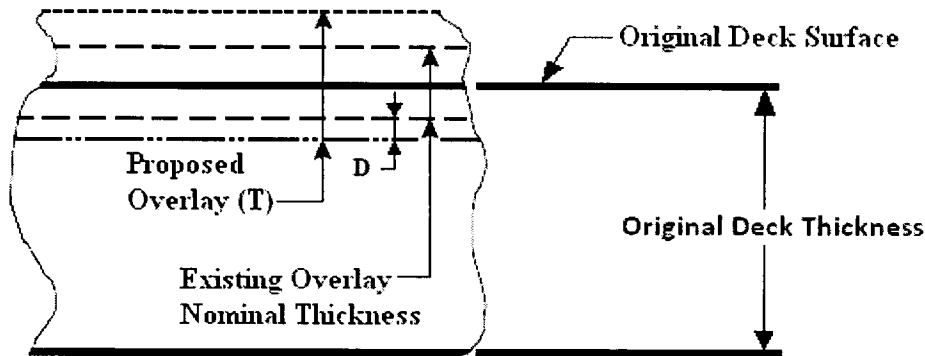
848 Lump sum \_\_\_\_\_ Test slab

- g. Quantities shall be specified for full depth repair based on required bridge deck evaluation. Required quantities shall be based on the definition for pay item in section 848.31.

848 Cubic yard \_\_\_\_\_ Full-depth repair  
(cubic meter)

**Bridge Decks with an existing Rigid overlay**

1. Where possible, the designer should identify a location for the disposal of hydrodemolition wastewater that is compliant with the Ohio EPA General Wastewater Disposal System Permit To Install (PTI) For Land Application Of Hydro-Demolition Wastewater. Size the area using a maximum application rate of 10,000 gal/acre and a typical hydro-demolition wastewater generation rate of 75 gallons per square yard of deck area overlaid. If a suitable disposal location exists, the contract plans shall include:
  - a. A Location Map to the disposal site (if the disposal site is not located within the project limits)
  - b. A site plan of the disposal site showing the location of all hydraulic features, buffers, water wells, storm sewers, catch basins, and other site features restricted by the permit in land application areas
2. Plans shall include a plan view showing the overlay limits.
3. Plans shall include a cross-section of the deck showing:
  - a. Finished height "T" (see section 848.03) of the MSC, SDC or LMC concrete overlay above the bottom of the uniform removal depth.
  - b. Uniform removal depth "D" (see section 848.03).
  - c. Uniform thickness of existing MSC, SDC or LMC concrete overlay to be removed.
  - d. Thickness of asphalt wearing course, if applicable.
  - e. Original deck thickness.



4. Plans shall include an Estimated Quantities Table with the following bid items:

- a. If an asphaltic overlay is on the concrete bridge deck a bid item is required

848 Square yard (square meter) Wearing course removed, asphalt

- b. Specify the nominal depth and the the square yard (square meter) quantity of the existing concrete overlay. The nominal depth should be based on the uniform overlay thickness specified in the previous overlay plans. This estimated nominal depth should be verified from cores taken during the bridge deck survey. Contact with the original overlay project's project engineer, or other original project personnel, may be beneficial in establishing the nominal depth.

An as per plan note is required if the plans for the previous overlay specified a variable thickness overlay.

848 Square yard Existing concrete overlay removed \_\_\_\_ nominal thickness  
(square meter)

- c. A item removal of Debonded or Deteriorated Existing Variable Thickness Concrete Overlay, is intended for removal, by hand chipping, any debonded, unsound, variable thickness existing rigid concrete overlay before hydro-demolition is performed. The square yard (square meter) should be based on three (3) items:

1. Original overlay project's bridge deck survey.
2. New project's bridge deck survey depth measurement
3. Contact with the original overlay project's project engineer and other project personnel.

The final number will be a guess. Comparison of expected variable thickness area for the new project as compared to original project may help establish a quantity.

848 Square yard Removal debonded or deteriorated existing variable thickness concrete  
(square meter) overlay

- d. Specify the overlay. Include type (LMC, SDC or MSC), thickness ("T") and quantity in square yard (square meter).

848 Square yard Concrete overlay using hydro-demolition [\_\_\_\_ inch (mm)] thick  
(square meter)

- e. Specify the removal quantities in square yard

848 Square yard Surface preparation using hydro-demolition  
(square meter)

- f. Specify the variable thickness quantity required. The variable thickness quantity is the amount of proposed overlay material below the uniform removal depth "D". Quantity shall be based on required bridge deck survey and evaluation required in section 400 of the Bridge Design Manual. Additionally type of overlay concrete (LMC, SDC or MSC) shall be specified.
- 848 Cubic yard \_\_\_\_\_ Concrete overlay (variable thickness), material only  
(cubic meter)
- g. Quantities shall be specified for full depth repair based on required bridge deck evaluation. Required quantities shall be based on the definition for pay item in section 848.31.
- 848 Cubic yard Full-depth repair  
(cubic meter)
- h. A nominal quantity of hand chipping shall be specified. Recommend 10% of the estimated variable thickness area of the deck (If 30% of deck is considered to require variable thickness repair the  $30 \times .10 = 3\%$  of deck square yardage would be specified for hand chipping. Other methods for quantities that have been developed are acceptable.
- 848 Square yard Hand chipping  
(square meter)
- i. Test Slab bid item shall be included for all projects
- 848 Lump sum Test slab